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be interesting to determine by raising plants from the different grains of one ear, guarding them carefully against all extraneous pollen, and noting the character of the resulting grain.

Dr. A. A. Hayes said the fact had been determined by direct experiment ten or twelve years ago, when the question arose whether the same stalk would furnish to each variety upon it its normal quantity of phosphates. It was found that this was the case, and each variety was reproduced the next year from the seed thus raised. At that time he found that all the varieties contain a salt of the peroxide of iron, instead of the protoxide.

Professor W. B. Rogers, referring to the discussion at the previous meeting on the noxious influence of various gases, particularly of carbonic acid and oxide, said, that, although all the recent Continental writers concur in regarding carbonic acid as simply negative in its influence, he had been surprised to find that the most recent English authorities still charge the whole of the pernicious effects of the inhalation of the fumes of burning charcoal to this gas, rather than to the oxide.

Dr. W. F. Channing thought that one source of the injury from breathing impure air was the interruption to the process of endosmose and exosmose, which it was well known was produced by even a slight admixture of carbonic acid.

Professor Rogers suggested that in crowded rooms organic compounds have a good deal to do with the deterioration of the air.

Four hundred and forty-ninth meeting.

March 9, 1858.—MONTHLY MEETING.

The Academy met at the house of the Hon. Josiah Quincy.
The PRESIDENT in the chair.

The Corresponding Secretary read a letter from Sir John Herschel, acknowledging the donation of the Academy's Transactions; also one from Mr. Henry T. Parker, offering his services as agent for the purchase of books for the Academy in England.

Professor C. C. Felton, referring to a previous communication of his on a fragment from Menander, remarked as follows :—

" It will be remembered, perhaps, that I made a short communication to the Academy about a year ago, entitled 'Menander in New York.' In that communication an account was given of an ancient Greek writing-tablet in Dr. Abbot's Egyptian Museum, containing a passage of poetry, which, for reasons stated at some length, I supposed to be a hitherto unknown fragment of Menander. It was mentioned, also, that there were other tablets of a similar description, more or less broken, but evidently written over with copies of the passage contained in the first, though apparently by less practised hands. On two of the broken tablets there was substituted for a word in the text another, expressing a ludicrous impatience on the part of the writers, as much as to say, ' Deuce take it.' On re-examining these tablets and fragments of tablets, during a recent visit to New York, I noticed two or three interesting particulars which had before escaped my attention. On one of the fragments is written the following part of a sentence (adding the accents and breathings), δ πρῶτος εὐ ποι— ; the rest being obliterated. At the bottom of another tablet is written part of a word, φιλοποι— ; the remainder of this word, also, being obliterated. The first is evidently a portion of a sentence written by the master to encourage the scholars, perhaps by the promise of a reward. The syllable ποι is evidently part of ποιήσων or ποιήσας, and the sentence was, ' He who first shall well perform his work — ' The rest must be left to the imagination. The second, φιλοποι—, is part of φιλόπονος or φιλοπόνως, meaning *careful*, or *carefully* or *industriously*, and seems to be an expression of the master's approbation of the manner in which the boy who owned the tablet had written out his copy. We have, therefore, in these tablets, — first, the copy set by the master; second, a sentence of encouragement to the boys; third, the master's approbation of one of them; and, fourth, a lively expression, φθαρήσεται, of the impatience of two of the rogues, who had got tired of the irksome task of writing. From these hints we may form a pretty good idea of a Græco-Egyptian school in the Ptolemaic times.

" Since last winter Dr. Abbott has sent from Egypt three wooden tablets of a different character and a later age. They are elliptical in shape, with a kind of triangular handle at each end. The inscriptions are funereal, recording the names, and in two of them the ages, of the

persons whom they commemorate. The first was found in Sacara. On this the inscription is neatly cut into the wood. It is as follows:—

Ανούβιων
Ἄρτεμιδω-
ρον, εὐμοιρει

Anoubion, son of Artemidoros, farewell.

In this inscription it is observable that the name of the deceased is Egyptian, with a Greek termination, while the name of the father is Greek. The name Anoubion occurs in Athanasius. The father of the Anoubion in the inscription was probably a Greek settler, and the son was born in Egypt, perhaps of an Egyptian mother. The form of the letters may belong to the second or third century before Christ.

“The second is from Dongola, and the inscription is written with ink and a reed pen. It is as follows:—

Πληνίς νεωτερος
μαρινα εβιωσεν
ετη λε

Plinius the younger, son of Marinas, lived thirty-five years.

Two or three things about this inscription are somewhat remarkable. It is considerably later than the preceding, as is evident from the Roman name Plinius, and from the style of the writing. The name is written in the abbreviated form, Πληνίς, which belongs to a comparatively late period. Theodoretus (Lib. II. c. 11) makes mention of a Πλήνιος as an Egyptian Bishop in the fourth century, the age of Athanasius, banished by the Arians, under the influence of George of Capadoccia.

“The name *Marinas* is not found elsewhere, so far as I know; but the form is analogous to *Zosas* (*Zωσᾶς*, gen. *Zωσᾶ*, which occurs in Boeckh's *Corpus Inscriptionum*) and many others. If the name is feminine, *Marina*, the syntax is that of the Latin ablative with *natus*, of which there are examples in the *Corpus Inscriptionum* (See Tom. II. p. 850). The name of *Marina* occurs in the Hagiology of the Oriental Church. She was a native of Pisidia, in Asia Minor, and was beheaded in A. D. 270. In the Ritual of the Greek Church, the 17th of July is given as the anniversary, or feast-day, *τῆς ἀγίας μεγαλομάρτυρος Μαρίνης*. For this fact, and the reference, I am indebted to my friend and colleague, Mr. E. A. Sophocles.

“The person here mentioned, Plinius, evidently belonged to a Ro-

man, perhaps a Christian family, who had learnt the Greek language in Egypt, but not well enough to avoid Latin idioms, if the last-mentioned construction is the true one.

"The third contains also an inscription written with ink as follows, without accents, like the others. The name Pericles is also written with abbreviated characters.

Περικλῆς Ἀπολλωνίου ἐβιώσεν
ετη πεντηκοντα οκτω

Pericles, son of Apollonius, lived fifty-eight years.

Both of the names here are pure Greek, belonging apparently to a family who, though living in Egypt, maintained their Hellenic traditions and Hellenic names unchanged. In the last two of these inscriptions, we observe the ancient euphemistic manner of speaking of death : they do not say that Plinius and Pericles died at such an age, but that they lived so many years.

"I also had time to examine another tablet, different from any of the preceding. It was made of some hard wood, probably cedar, carefully smoothed, about a quarter of an inch in thickness, twelve inches in length, and six in breadth. Across one end three or four lines had been written with a reed pen and Egyptian ink. This writing was to a considerable extent obliterated,—only single letters and isolated syllables remaining legible, but not enough to make out the text. Beneath this was drawn a waving line, to separate it from the writing below, which, on a careful comparison, was evidently a number of copies of the writing at the top, though in an inferior hand. The form of the letters is characteristic of the chirography which prevailed from about the second century before Christ until the fourth or fifth century after ; and it may be placed, with a good degree of probability, at least as early as the first century before Christ. The writing at the top of the tablet is, again, evidently that of the schoolmaster, and that which occupies the remainder of the surface, consisting of three entire copies and part of a fourth, is evidently the writing of a scholar. The copies of the scholar are not so much obliterated as the writing of the master, and, on comparing them all, I was able clearly to make out every word of the text. It forms two iambic trimeters, which, supplying the accents, and correcting one word which is misspelt, read as follows :—

ὦ μὴ δέδωκεν ἡ τύχη κοιμωμένῳ,
μάτην δραμεῖται καν ύπερ Λάδαν δράμη.

It may be translated :

‘The man whom, sleeping, Fortune has not blessed,
Shall run in vain, though Ladas he outran.’

The style of these lines is pointed and pithy ; their structure is rhythmically perfect, and the composition undoubtedly belongs to the best age of the new comedy. The Greek word *Tύχη* does not mean exactly *Chance* or *Fortune*, but rather the secret power which allots to mortals their varied faculties and conditions in life. The thought conveyed in the passage is, that without natural gifts or endowments no great thing can be accomplished. Unless it is *in* a man, achievement, success, cannot come *out* of him. The word misspelled in the copies is *δραμιται* for *δραμειται*, which shows that when this was written *ει* and *ι* were pronounced alike. I assign the composition of the lines to a period much earlier than that to which the handwriting of the copies belongs, but I would not venture to attribute them to any particular poet. Ladas was a Spartan runner who gained the victory in the *δολιχός δρόμος*, or *long race*, and soon afterwards died. The precise period when he lived is nowhere recorded ; but as a bronze statue of him, by the sculptor Myron, was well known to the ancients, and as Myron flourished in the fifth century before Christ, Ladas must have gained his victory at least as early as the middle of that century.

“ Among the Greek epigrams, there are two in which the name of Ladas is commemorated ; both are *ἀδέσποτα*, or anonymous. The first consists of a hexameter and pentameter, as follows :—

Λάδας τὸ στάδιον εἴθ' ἥλατο εἴτε διέπτη,
Δαιμόνιον τὸ τάχος, οὐδὲ φράσαι δυνατόν.

*Whether Ladas leaped or flew through the stadium
It is impossible to say ; his speed was divine.*

“ The second is on the statue of Ladas by Myron. It consists of eight lines, hexameters and pentameters alternately, as follows :—

Οῖος ἔης φεύγων τὸν ὑπήνεμον, ἔμπνοε Λάδα
Θῦμον, ἐπ' ἀκροτάτῳ πνεύματι θεὶς ὄνυχα
Τοῖον ἔχακευσεν σὲ Μύρω, ἐπὶ παντὶ χαράξας
Σώματι Πιστίου προσδοκίαν στεφάνου.
Πλήρης ἐλπίδος ἔστιν, ἄκροις δ' ἐπὶ χειλεστιν ἀσθμα
Ἐμφαίνει κοῖλων ἔνδοθεν ἐκ λαγόνων.
Πηδήσει τάχα χαλκὸς ἐπὶ στέφος, οὐδὲ καθέξει
Ἄ θάσις. ὁ τέχνα πνεύματος ὡκυτέρα.

*As thou wast, O breathing Ladas, fleeing from the wind swift
 Thymus, on the top of the breeze placing thy foot,
 Such Myron cast thee in bronze, stamping upon all
 Thy body the expectation of the Pisæan crown.
 Full of hope is he, and on the tip of his lips the panting breath
 Shows itself from the hollow flanks within.
 Soon the bronze shall leap for the crown, nor shall withhold it
 The pedestal; O art, swifter than the breeze!*

“The commentators have found some difficulty in understanding the words ἐπ' ἀκροτάφῳ πνείματι θεὶς ὄνυχα, ‘placing thy foot upon the top of the breeze’; but they describe exactly the attitude of John of Bologna’s Mercury, a well-known work of art, which furnishes the best commentary on the passage in question.

“Among the Roman poets Ladas is alluded to once by Catullus, twice by Martial, and once by Juvenal; Pausanias, the Greek traveller, mentions him three times. In Lib. ii. 19. 7, he speaks of a statue of Ladas in the temple of Lycian Apollo at Argos; in Lib. iii. 21. 1, he mentions the monument of Ladas on the bank of the Eurotas, a short distance out of Sparta; and in Lib. viii. 12. 3, he states that on the road leading from Mantinea to Orchomenos, there was a place called the stadium of Ladas, because Ladas used to exercise himself there as a preparation for the Olympic games.”

Rev. N. L. Frothingham said:—

“It is with great diffidence that I venture to add anything to what my learned friend has just offered to the notice of the Academy. But I am very much struck with the coincidence of thought between the fine passage which he has restored to Greek literature and a verse in one of the Hebrew Psalms. That verse is rendered so incorrectly in our received English translation, that the parallelism does not appear. But it will be brought out, if we read the whole context thus, as it ought to be read: ‘Except the Lord build the house, they labor in vain that build it; except the Lord keep the city, the watchman waketh but in vain; in vain for *you* to rise up early, to sit up late, to eat the bread of anxiety, while he giveth to his beloved when they are asleep.’ Now, if, instead of the word Fortune,—Τύχη I think it is in the Greek sentence,—we should substitute some such expression as Divine Providence, the sentiment would correspond per-

fectly with that of the sacred Psalmist. Exchange the heathen phrase for a Biblical one, and there results the same thought; and a very profound and noble thought it seems to me to be."

Mr. Charles Folsom referred to the fact, that tablets similar in form to that described by Professor Felton are still in use, in Northern Africa, for the same purpose.

Mr. Folsom also alluded to the inscription which he had laid before the Academy at the previous meeting, and announced his acceptance of Professor H. W. Torrey's version, by which the obscurity and inelegance of the inscription are removed.

The President said he was induced, by the discussion on some of the terms in the inscription, to allude to a point which had often occurred to him, namely, the impropriety of the use of the word *Respublica* in the Catalogue and Diplomas of Harvard University; and he proceeded to show that classical usage does not sanction the application of this word in a geographical sense, as is the case in the instances above mentioned.

Professor E. N. Horsford exhibited a number of photographs of a piece of recent ice, by which its intimate structure was very accurately shown.

Mr. Henck gave a demonstration of a general theorem, which he believed to be new, relating to circles tangent to each other and to two given circles,—the given circles being also tangent to each other. This theorem embraced as particular cases the two remarkable propositions concerning similar circles given by Pappus Alexandrinus in the fourth book of his Mathematical Collections. In the course of the demonstration, several interesting properties were developed, some of which he thought had been hitherto unnoticed.

Dr. A. A. Hayes made a communication "On the Corrosion of Yellow-Metal Sheathing, in Sea-water," as follows:—

"In some earlier researches on the chemical and mechanical constitution of alloys, I have demonstrated the existence of several definite

compounds of two metals, or one metal with a metalloid, united to form a ductile body.

"The chemical analysis, by the *proximate way*, of yellow-metal, has shown that, when it is formed from pure copper and pure zinc, there exist *two* distinct alloys. One of these is the well-known alloy of two equivalents of copper, united to one equivalent of zinc; the other is composed of one equivalent of each of these metals, in chemical union. A mass of yellow-metal presents, therefore, a crystalline aggregate of two alloys, in which the *percentage* proportion of copper is sixty, while the zinc has the proportion of forty; and analysis having in view the percentage of these metals only, gives usually nearly these quantities.

"As the relation of zinc to oxygen differs remarkably from that of copper, it might have been inferred that an alloy composed of one equivalent of copper and one equivalent of zinc would also have a different relation to oxygen, when compared with one that contains two equivalents of copper. Considering sea-water action simply as oxidation, under the most favorable conditions for combination without the application of artificial heat, the study of the corrosion of yellow-metal under exposure offers a simple and unobjectionable course for obtaining trustworthy facts.

"It is well known that this yellow alloy, when carefully secured on sailing-vessels, quickly exhibits marks of corrosive action when more or less immersed in sea-water. The rapidity of this action diminishes after the formation of a certain proportion of oxide, which, slightly mixed with chlorides, serves as a protecting surface to the metal below, by close adhesion. A serviceable duration of thirty-six to forty-eight months is expected, in sheets of ordinary thickness.

"The specimens which accompany this paper are parts of sheets which have been exposed nearly forty-eight months. In the one which represents the alloy in the condition it was in when it was placed on the vessel, at one part, analysis shows a percentage composition—neglecting traces of lead and other metals—of copper 60, zinc 40.

"Another specimen, which has been corroded deeply, exhibits to the naked eye a mechanical structure unlike that of the first piece: it retains only part of its original ductility, and this unequally. Crystalline particles are seen, and, even in the interior of the mass, oxygen has penetrated, and combined with the metals. The composition of this piece is, copper 63.6, zinc 33.9, oxygen 2.0, lead and other metals, 0.5 = 100.

"In the third piece, which is a part of the last, corrosion has proceeded to the extent of destroying cohesion nearly: the particles remain attached only through an interlacing of contiguous parts, separating at once when the sheet is doubled, or beaten into crystalline grains, coated by a thin layer of oxide. By the chemical action the composition of this piece has undergone a great change, and analysis gives the percentage of copper 74.5, zinc 22.8, oxygen 2.1, lead 0.6 = 100.

"At several points deep cavities, and in many sheets holes, exist; these have been caused by the corrosion around grains of slag, which had been rolled into the mass of the metal. In such cases the slag is a negative body to the surrounding metal, *after corrosion commences*, and an increased power of action is thus gained, locally. Carefully conducted experiments prove the correctness of the theoretical deduction, that the alloy represented by copper, two equivalents, and zinc, one equivalent, has an inherent negatively electrical condition, when compared with the alloy of one equivalent of copper and one equivalent of zinc; and this state has been found in the cleaned parts remaining of sheets which have suffered the largest amount of corrosion.

"But the chemical evidence which we thus obtain of the abstraction of the most positive alloy by sea-water action, is not more interesting than that of a physical character. Every piece which has been disintegrated presents highly crystalline — almost regularly crystallized — assemblages of the alloy of two equivalents of copper to one equivalent of zinc, as its mass.

"Now, in the ductile metal before exposure, we detect the facets of these crystals of this alloy, which might be mistaken for those found in many laminated pure metals, while the chemical action, being confined to the most positive alloy, brings them more and more distinctly to view, enabling us to prove that these large masses of metal, in corroding, divide mechanically, as well as chemically, into two pre-existing alloys; one oxidizing and being washed away, while the other, nearly pure, remains coherent to some extent.

"It had been long known that the corroded metal, when about to be re-manufactured, called for the addition of zinc, in order to form the normal alloy; the facts here stated prove that the abstraction of the larger proportion of zinc arises from the removal of the most positive of two alloys, which were united in the perfect metal as a homogeneous mass.

"As multiplied observations have shown that the merchant service

requires *a certain continuous solution of the sheathing metal*, in view of the present enormous consumption, this subject has economical bearings of great importance. It is probable that an alloy, forming part of a mixed metal, might be found, less positive in its relation than the one removed from yellow-metal, and yet sufficiently oxidizable to preserve the surface clean while the vessel is in motion. Such an alloy united to brass would present the mechanical requirements, in union with a chemical resistance called for, in sheathing metals."

Professor W. B. Rogers gave an account of his experiments on the production of sounds by flames within glass tubes, and explained the principle of their formation.

Professor Felton alluded to the newly discovered process of Photo-lithography, which had been announced to the Academy by Dr. W. F. Channing at the previous meeting, and suggested that it offered an admirable method for the reproduction of the inscription on an ancient papyrus in Dr. Abbot's Egyptian collection. He had spoken to the inventors of the process, and the plan of reproducing it in this way seemed to them quite practicable. If it could be done, this would be the second inscription of that kind which had ever been published.

Dr. Channing said he had no doubt the inscription could be lithographed by this process at a moderate cost, and moved that the Publishing Committee take into consideration the expediency of thus bringing before the scientific world this interesting papyrus. The motion was seconded by Professor Felton, and adopted. Dr. Channing was added to the committee for this purpose.

Four hundred and fiftieth meeting.

April 13, 1858.—MONTHLY MEETING.

The Academy met at the house of Hon. C. F. Adams.

The PRESIDENT in the chair.

A letter was read from Mr. John Akhurst, of Brooklyn, N.Y., dated March 30, offering to forward to the Academy certain